RCC TELEVISION Service Manual

PUBLISHED BY RADIO COLLEGE OF CANADA, TORONTO

1954-55 Supplement No. 13

GORDON OLIVER TELEVISION
RADIO SERVICE
923 CALVERHALL ST.
YO 4815
NORTH VANCOUVER, B. C.

INDEX

ADDISON

ADMIRAL

CBS-COLUMBIA - See Addison

ELECTROHOME

HALLICRAFTERS

MOTOROLA

OLYMPIC - See Racine

RACINE

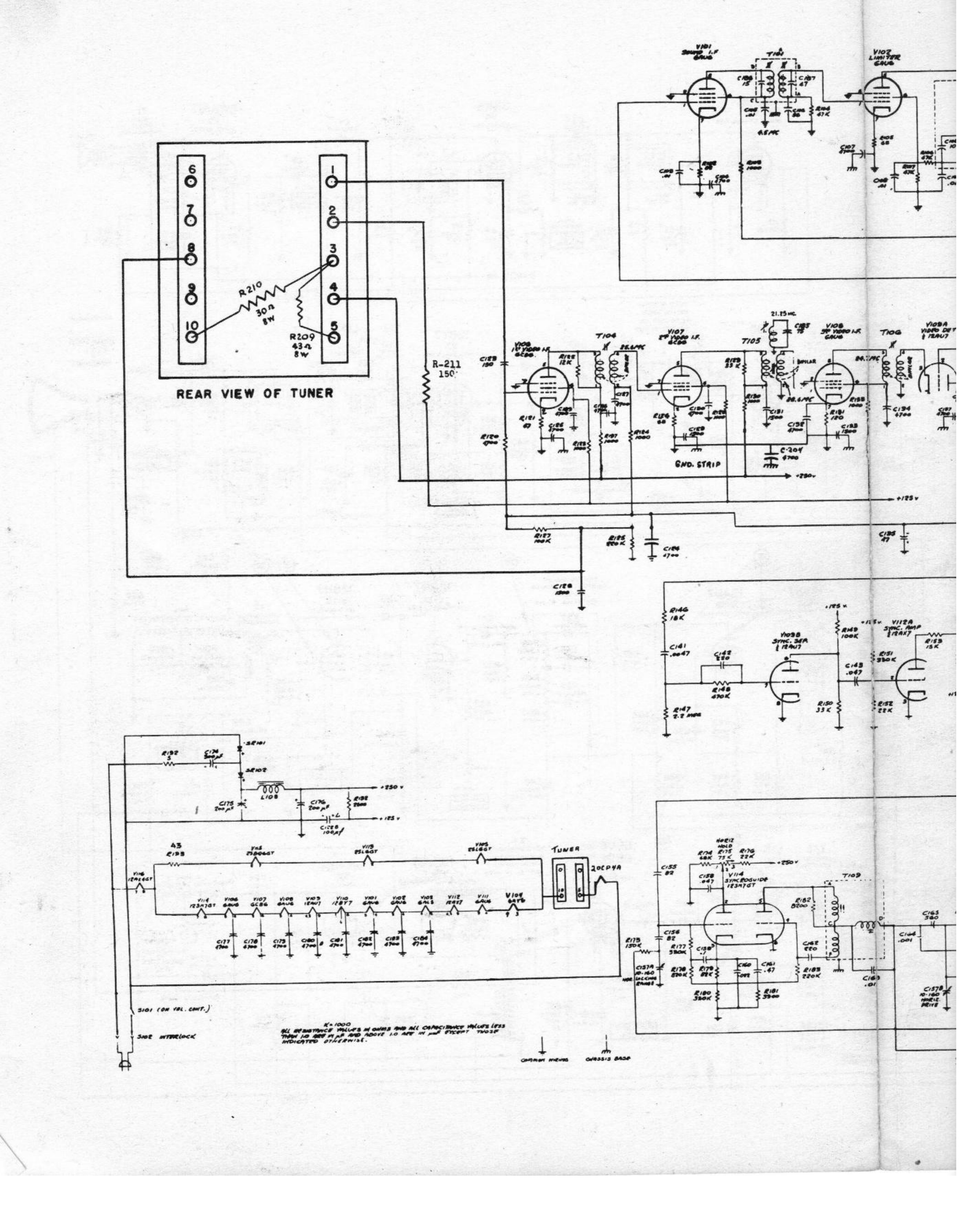
RCA-VICTOR

SPARTON

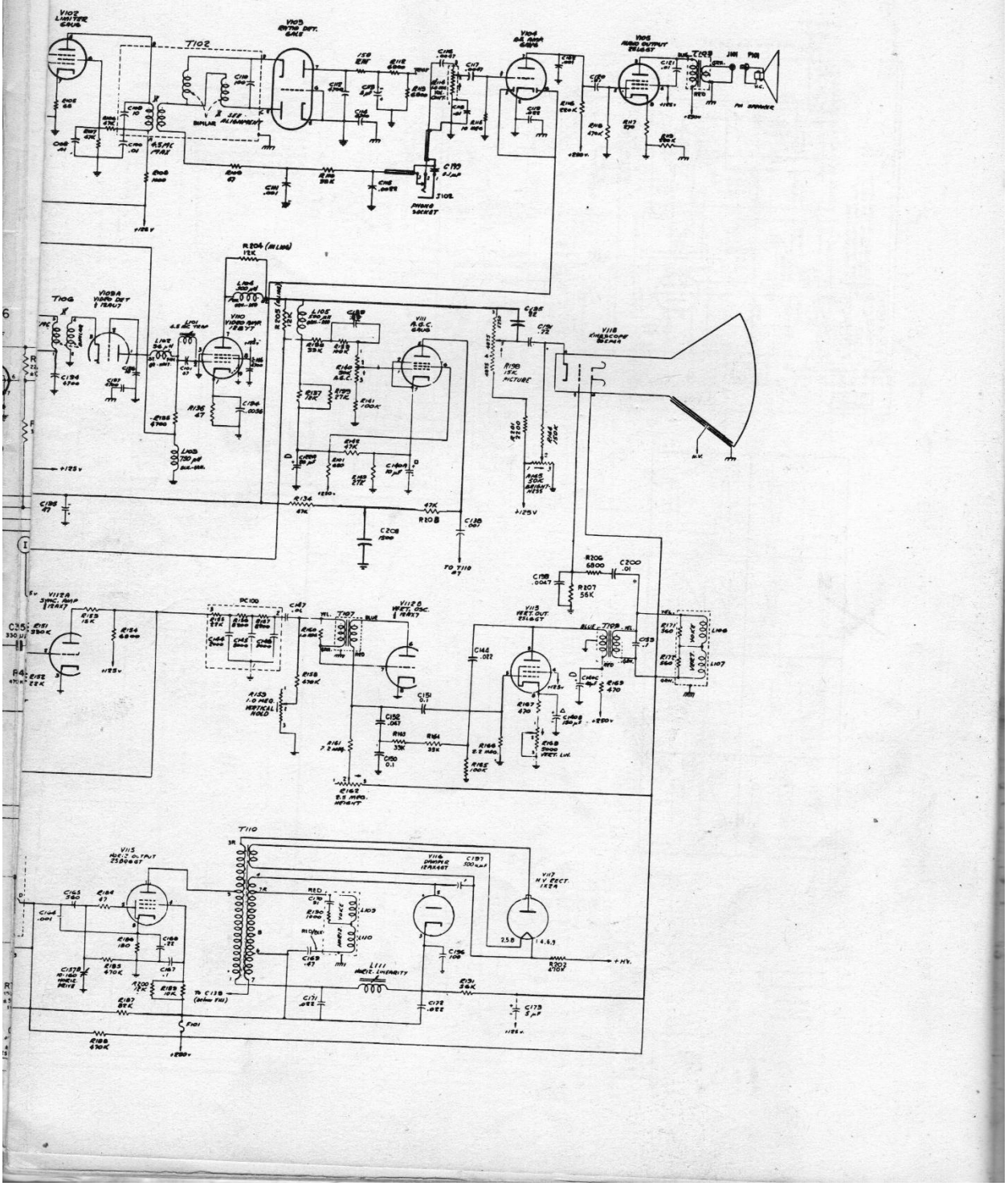
SYLVANIA NORTHERN ELECTRIC

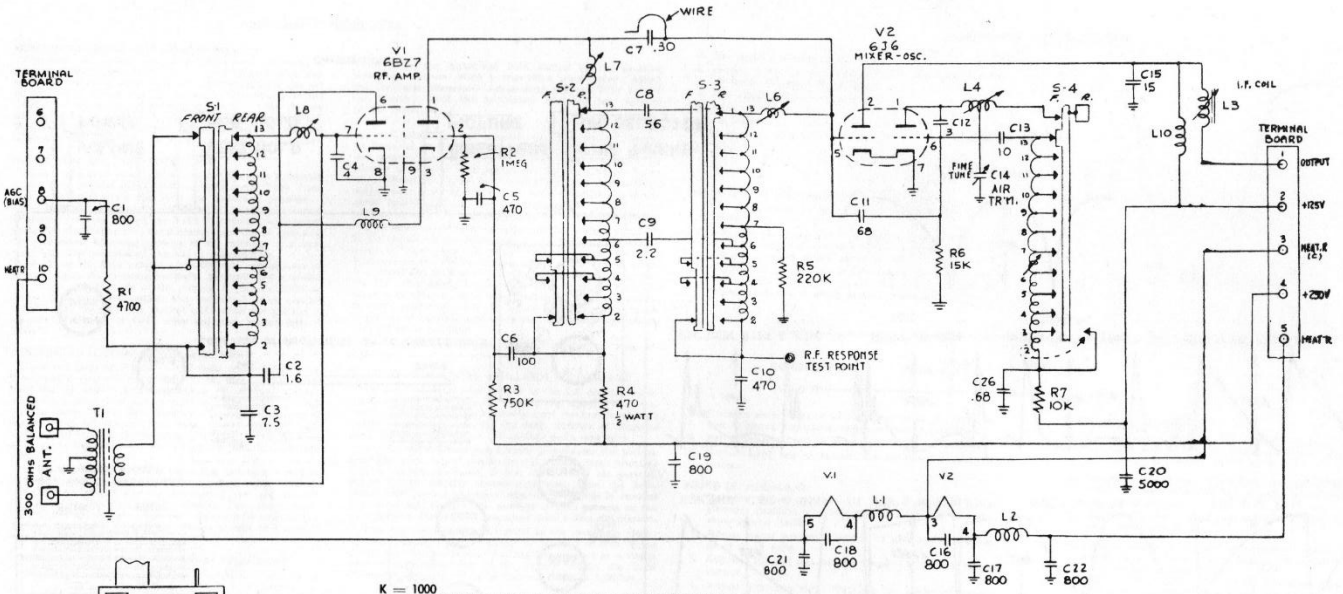
VIKING

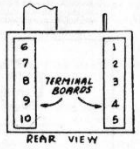
RCC TELEVISION Supplement No. 13


REAR VIEW OF TUNER
R210
30Ω
8W
R209
43Ω
8W
R-211
150
GND. STRIP
TUNER
K=1000
ALL RESISTANCE VALUES IN OHMS AND ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN μF AND ABOVE 1.0 ARE IN μμF EXCEPT THOSE INDICATED OTHERWISE.

RCA-VICTOR
17T46 Etc.







K = 1000
ALL RESISTANCE VALUES IN OHMS AND ALL CAPACITANCE VALUES IN MMF. UNLESS OTHERWISE STATED.

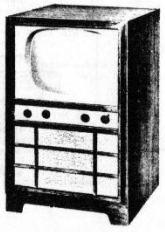
NOTE:
ON SOME TUNERS V-1 IS A 6BQ7 TUBE.

SCHEMATIC DIAGRAM FOR R.F. Tuner used on Models 17T46, 17TC56, 20T74, 20TC85

20T74 (Shelby) On Base

20TC85 (Hampton)

17T46 (Townsman) On Base



17TC56 (Highland)

J-102	S-4465	Jack-Phono jack
L-101	S-9413	4.5 M.C. Trap (on base)
L-102	S-9106	Coil - Peaking Coil 36 u.h.
L-103	S-9483	Coil - Peaking coil 750 u.h.
L-104	S-9405	Coil - Peaking Coil 12K, 500 u.h.
L-105	S-9405	Coil - Peaking Coil 12K, 500 u.h.
L-106		Vert. Yoke
L-107		Vert. Yoke
L-108	S-9468	Reactor Choke
L-109		Horizontal Yoke
L-110		Horizontal Yoke
L-111	71449	Coil - Horizontal linearity
T-101	S-9416	Transformer -- Sound I. F.
T-102	S-9418	" - Ratio Det.
T-103	S-9407	" - Output (audio)
T-104	S-9398	" - 2nd I. F. Trans.
T-105	S-9399	" - 3rd I. F. Trans.
T-106	S-9398	" - 4th I. F. Trans.
T-107	S-9467	" - Blocking Osc. Trans.
T-108	S-9469	" - Vert. Out. Trans.
T-109	S-9415	" - Hor. Osc. Trans.
T-110	S-9395	" - H.V. Trans.
	S-9465	Unit - R. F. Tuner

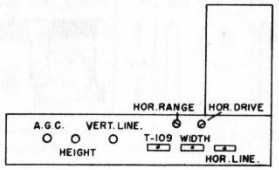
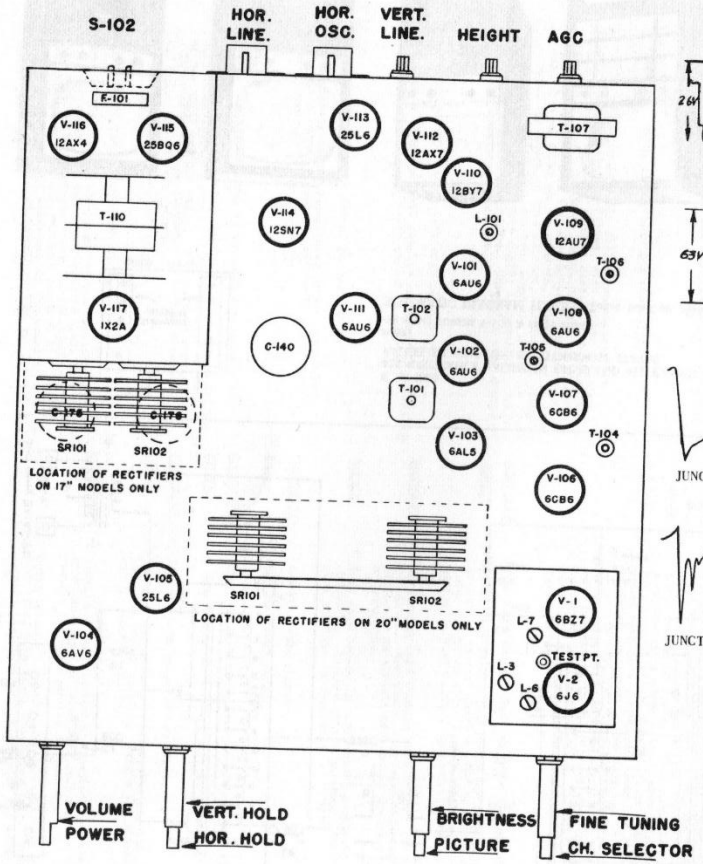
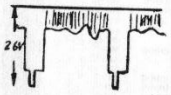


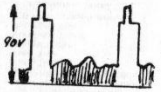
Fig. 1 Chassis Rear Apron Adjustments



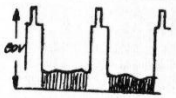
CHASSIS LAYOUT



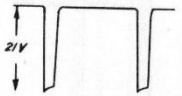
PIN 2 of V110



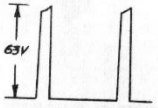
PIN 7 of V110



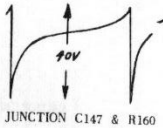
JUNCTION C141 & R147



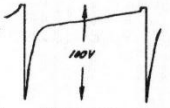
PIN 6 of V109B



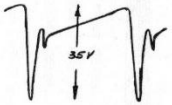
PIN 1 of V112A



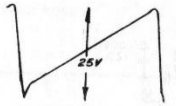
JUNCTION C147 & R160



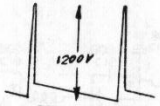
PIN 7 of V112B



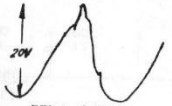
PIN 6 of V112B



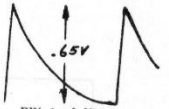
JUNCTION C152 & R161



PIN 3 of V113

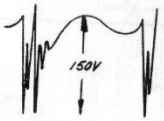


PIN 1 of V114

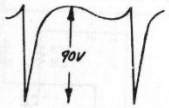


PIN 3 of V114

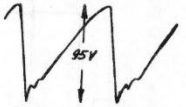
JUNCTION R179 & R180



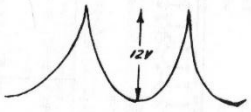
PIN 5 of V114



TER 'C' of T109



JUNCTION C165 & R184



PIN 8 of V115

RESPONSE CURVES

ALIGNMENT PROCEDURE

HORIZONTAL OSCILLATOR ADJUSTMENT:

Normally the adjustment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator wave form adjustment requires the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustment in the field. However, the waveform adjustment should be checked whenever the horizontal oscillator operation is improper.

HORIZONTAL FREQUENCY ADJUSTMENT:

With a clip lead, short circuit the coil between terminals C and D of the horizontal oscillator transformer T109. Tune in a television station and sync the picture if possible.

A. — Turn the horizontal hold control R175 to the extreme clockwise position. Adjust the T109 Frequency Adjustment (atop the chassis) so that the picture is just out of sync and the horizontal blanking appears in the picture as a vertical bar. The position of the bar is unimportant.

B. — Turn the hold control approximately one quarter of a turn from the extreme clockwise position and examine the width and linearity of the picture. If picture width or linearity is incorrect, adjust the horizontal drive control C157B, and the linearity control L111 until the picture is correct. If C157B or L111 were adjusted, repeat step A above.

HORIZONTAL LOCKING RANGE ADJUSTMENT:

Turn the horizontal hold control fully counter-clockwise. The picture may remain in sync. If so, turn the T109 top core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Momentarily remove the signal by switching off channel then back. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 9 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C157A slightly clockwise. If less than 7 bars are present, adjust C157A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 7 to 9 bars are present.

HORIZONTAL OSCILLATOR WAVEFORM ADJUSTMENT:

Remove the shorting clip from terminals C and D of T109. Turn the horizontal hold control to the extreme clockwise position. With a thin fibre screw-driver, adjust the Oscillator Waveform Adjustment Core of T109 (under the chassis) until the horizontal blanking bar appears in the raster.

A. — Connect the low capacity probe of an oscilloscope to terminal C of T109. Turn the horizontal hold control one quarter turn from the clockwise position so that the picture is in sync. The pattern on the oscilloscope should be as shown on Figure 34. Adjust the Oscillator Waveform Adjustment Core of T109 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting the hold control if necessary.

This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator becomes more serious. On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the hold control approaches the clockwise position.

Remove the oscilloscope upon completion of this adjustment.

CHECK OF HORIZONTAL OSCILLATOR ADJUSTMENTS:

Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 2 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C157A slightly clockwise. If less than 2 bars are present, adjust C157A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 bars are present.

Turn the horizontal hold control to the maximum clockwise position. The picture should be just out of sync to the extent that the horizontal blanking bar appears as a single vertical or diagonal bar in the picture. Adjust the T109 Frequency Adjustment until this condition is fulfilled.

ALIGNMENT INSTRUCTIONS

Prior to any alignment an isolation transformer (117V/117V) should be used.

TRAP ALIGNMENT

1. Set up a 3.0 volt bias using standard cells. Connect the positive to the common ground and the negative to the junction of R127 and C135 (AGC).
2. Set signal generator to 21.25MC AM 400 cycles 30% modulation and connect to test point on tuner, 'hi' end to test point and 'lo' end to common ground.
3. Connect 'hi' end of scope to contrast control (sliding arm) and low end to metallic shield strip. At this point a sinc wave with a super-imposed noise will appear on scope.
4. Adjust the sound trap T105 bottom for minimum amp': tude.

ALTERNATE METHOD:

If a signal generator is capable of delivering an output of one volt adjust the trap as follows:

(a) Connect the signal generator to the test point on the tuner (as above).

(b) Connect 'hi' end of voltohmyst to junction of L101 and L102 (Grid circuit of 12BY7, V110 video amplifier) and 'lo' end to junction of copper shield and common ground above V110.

(c) Adjust T105 bottom (21.25 MC trap) for minimum output on meter.

VIDEO I.F. ALIGNMENT

1. Set up a 4.5 volt bias using standard cells. Connect the positive to the common ground and the negative to the juction of R127 and C135 line.
2. Connect signal generator to test point on tuner as described in trap alignment.
3. Set signal generator to 24.7 MC 400 cycles 30% modulation.
4. Connect 'hi' end of scope to contrast control (sliding arm) and low end to junction of copper strip and shield above V110.
5. Connect 'hi' end of voltohmyst to junction of L101 and L102 (Grid of 12BY7, V110 video amplifier(and 'lo' end to junction as mentioned above. It is suggested that the voltohmyst be set on the 10 volt range and zero centered for the remaining alignment.
6. Adjust T106 top 4th video I.F. for a maximum output on meter, not to exceed—2 volts if it does, reduce generator output.

NOTE

This alignment can be accomplished by use of the scope.

(a) Connect scope hi end to contrast control (slide arm) and low end to junction of copper strip and common ground shield.

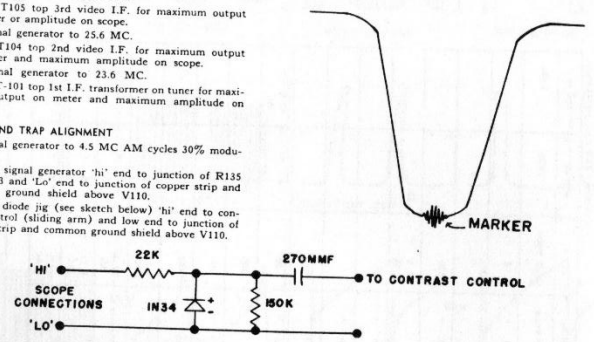
(b) Adjust T106 top for maximum amplitude on scope.

ALIGNMENT INSTRUCTIONS

7. Set signal generator to 22.6 MC.
8. Adjust T105 top 3rd video I.F. for maximum output on meter or amplitude on scope.
9. Set signal generator to 25.6 MC.
10. Adjust T104 top 2nd video I.F. for maximum output on meter and maximum amplitude on scope.
11. Set signal generator to 23.6 MC.
12. Adjust T-101 top 1st I.F. transformer on tuner for maximum output on meter and maximum amplitude on scope.

4.5 MC SOUND TRAP ALIGNMENT

1. Set signal generator to 4.5 MC AM cycles 30% modulation.
2. Connect signal generator 'hi' end to junction of R135 and L103 and 'Lo' end to junction of copper strip and common ground shield above V110.
3. Connect diode jig (see sketch below) 'hi' end to contrast control (sliding arm) and low end to junction of copper strip and common ground shield above V110.



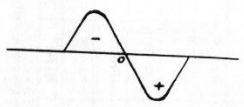
4. Connect scope 'hi' end to output of diode jig and low end to above mentioned common ground junction.
5. Set contrast control in maximum clockwise position.
6. Adjust L101 top or bottom for minimum output on scope.

SOUND I.F. ALIGNMENT

1. Connect voltohmyst 'lo' end to test point of Ratio Detector junction of R112 and R113 'hi' end to common ground shield.
2. Adjust signal generator output to give meter reading of -4 to -5 volts.
3. Adjust T101 top and bottom Sound I.F. for maximum output.
4. Adjust T102 top Ratio Detector for maximum ouput. In steps 3 and 4 if — 5 volts is exceeded, the output of the generator should be lowered and kept within the — 5 volt limit.

RATIO DETECTOR ALIGNMENT

1. Connect meter 'hi' end to junction of C115 and R110 'lo' end is kept on test point of Ratio Detector.
2. Connect scope to voice coil.
3. Adjust T102 bottom for minimum output on scope keeping generator output at same level as used in Step 4 of Sound I.F. Alignment. Adjust T-102 and observe meter swing above and below the zero setting; the correct zero setting is at the centre of swing from left to right. NOTE—in some cases, the zero balance will not coincide with minimum amplitude on the scope, and therefore a limit ±1 volt is acceptable.



Ratio Detector Curve

SWEEP SOUND ALIGNMENT

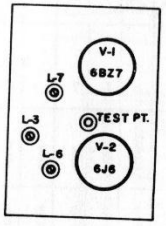
1. Connect sweep generator 'hi' end to junction of R135 and L103 and 'lo' end to junction of copper strip and common ground shield above V110.
2. Connect scope to lug "A" of T101 through an isolating resistor of approximately 100 K and low end to above mentioned ground.
3. Calibrate scope to read maximum of 2 volts peak to peak developed at lug "A".
4. Loosely couple a 4.5 MC unmodulated signal to the sweep cable to refer to as a marker. (Connecting both leads to chassis is sufficient).
5. Adjust T101 top and bottom for maximum amplitude and most symetrical curve about the 4.5 MC marker.

R.F. TUNER:

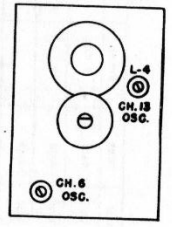
NOTE: Channel 13 and Channel 6 oscillator adjustments are of the screw driver type. Channel 12-7 oscillator coils are adjusted by moving the loop wire located on the wafer terminals to or away from the wafer.

Channel 5-2 oscillator coils are adjusted by closing or spreading the turns of the coils.

Turn L-3 I.F. core until the screw is 3/8" above core holder.



Top View of Tuner



Front View of Tuner

VOLTAGE CHART

Condition - 3500 u v. Signal Input

SYM	TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
V101	6AU6	0 Volts	- Volts	*6.4 Volts AC	*6.4 Volts AC	135 Volts	135 Volts	.8 Volts	Volts	Volts
V102	6AU6	-9 "	- "	*6.6 " AC	*6.6 " AC	140 "	55 "	.2 "		
V103	6AL5			* 6 " AC	* 6 " AC					
V104	6AV6	-1. "	0 "	*6.2 " AC	*6.2 " AC	-4.6 "	-4.6 "	120 "		
V105	25L6GT		23.5 " * AC	270 "	140 "	.3 "		23.5 " * AC	12.0 "	
V106	6CB6	-4.4 "	.2 "	*6.2 " AC	*6.2 " AC	270 "	140 "			
V107	6CB6	-3. "	.55 "	*5.9 " AC	*5.9 " AC	275 "	140 "			
V108	6AU6	0 "		*6.2 " AC	*6.2 " AC	140 "	140 "	1.3 "		
V109	12AU7	-1.7 "	-1.7 "	0 "	*6.5 " AC	*6.5 " AC	32 "	-50 "	0 "	*6.5 " AC
V110	12BY7	1.0 "	-1.7 "		* 6 " AC	* 6 " AC		150 "	150 "	
V111	6AU6	72 "	100 "	*6.0 " AC	*6.0 " AC	-6 "	270 "	100 "		
V112	12AX7	92 "	-.3 "	0 "	*6.5 " AC	*6.5 " AC	120 " ✓	-14 "	0 "	*6.5 " AC
V113	25L6GT		* 25 " AC	260 "	150 "	0 "		* 25 " AC	17.0 " ✓	
V114	12SN7GT	-5.8 "	188 " ✓	+ 6 "	-72 "	200 "		10.5 " AC	10.5 " AC	
V115	25BQ6GT	- "	* 21 " AC		200 "	16 "		* 21 " AC	18 "	
V116	12AX4GT			620 "				12.3 " * AC	12.3 " * AC	
V118	20CP4A	Pin #12 - 6.3 AC		Pin #11 - 100 ✓		Pin #10 - 580+B boosted				

* Measured across filaments

V112 ✓ affected by setting of R162
V113 ✓ affected by setting of R168
V114 ✓ affected by setting of R175

V118 ✓ affected by setting of R144
V114 + with hor. time base locked.

ALIGNMENT INSTRUCTIONS

OSCILLATOR ALIGNMENT:

There are two ways in which the oscillator circuits may be aligned.

(a) By use of a voltohmyst and a marker generator supplying sound carrier frequencies.

(b) By use of a sweep generator, a marker generator and an oscilloscope.

The following procedure is the method of aligning the oscillator as stated in Section "A."

1. Check the video and sound I.F. alignment and make sure that the I.F.'s are peaked to the correct frequencies.
2. Check that the sound trap is accurately aligned, as this method of aligning the oscillator is solely dependended on the trap accuracy.
3. Connect voltohmyst to junction of L-101 and L-102.
4. Connect marker generator to antenna terminals and set to sound carrier frequency for channel 13.
5. Set fine tuning control to mechanical centre.
6. Set tuner to channel 13 and adjust oscillator L-4 for maximum voltohmyst reading. Note: The correct dip is located where the voltohmyst reading falls from a large value to a minimum and as the adjustment is continued, the reading will start to increase again. This minimum point is the correct setting.
7. Adjust oscillator in this manner for each of the Sound Carrier I.F. Frequency is tuned into the sound I.F. trap.

8. Adjust L-8 for maximum gain between markers.
9. If the curve does not appear symmetrical, it may be necessary to compensate the curve by not fully peaking R.F. plate coil and repeaking the mixer grid. This procedure may be reversed until a good curve is obtained.

NOTE: Channel 13 must be very symmetrical or else channels 12-2 will be difficult to align.

10. Switch tuner, sweep and marker generator to channel 6, feeding in correct sound and picture carrier markers.
11. Adjust channel 6 R.F. amplifier plate coil for maximum peak at sound carrier marker by spreading or closing up the coil winding.
12. Adjust channel 6 mixer coil in grid circuit of 6J6 mixer oscillator tube for maximum peak at picture carrier marker by squeezing or closing up the coil winding.
13. Adjust channel 6 antenna coil for maximum gain between markers.

13A. If curve is not symmetrical see Step 9A.

NOTE: Channel 6 antenna coil consists of two coils in series with their junction tapped and connected to the antenna input transformer. Adjust only the coil which is connected between the top and channel 5 antenna coil.

14. Switch tuner to channel 13 and check the alignment.
15. Switch tuner to channels 12-7 and adjust appropriate R.F., mixer grid and antenna coils by bending wire inductance against or away from the chassis on channel (12-7) and by closing or spreading turns in the the coils on channel (6-2).
16. Switch tuner to channel 6 and check response.
17. Switch tuner to channel 5-2 and adjust the R.F. mixer grid and antenna coils as stated above.
18. Check tuner response on channel 13 to 2 making odd adjustments for correct curve (See curves below).

The following curves are acceptable.

ANTENNA & R.F. ALIGNMENT:

1. Connect a -3 volt bias supply to junction of R127 and C128. Positive end to common grid, negative end to ground.
2. Connect sweep generator to antenna terminal and set to channel 13.
3. Connect marker generator to antenna terminal through an isolating resistor of approximately 1000 ohms and feed in appropriate sound and picture carrier frequency.